

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
1 September 2005 (01.09.2005)

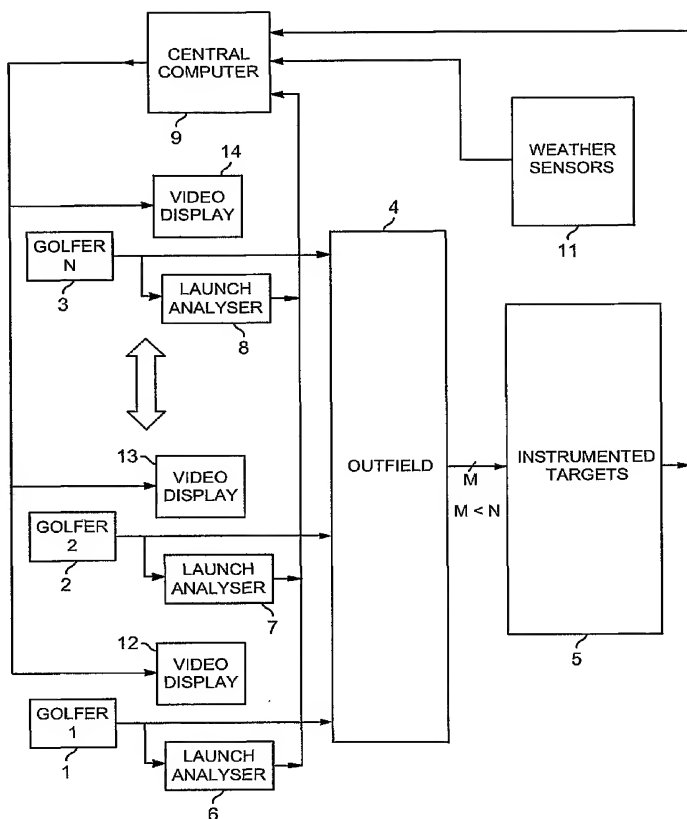
PCT

(10) International Publication Number  
**WO 2005/081014 A1**

- (51) International Patent Classification<sup>7</sup>: **G01S 17/58**, (74) Agent: COLES, Graham, Frederick; Graham Coles & Co, 24 Seeleys Road, Beaconsfield, Buckinghamshire HP9 1SZ (GB).
- (21) International Application Number: PCT/GB2005/000611
- (22) International Filing Date: 18 February 2005 (18.02.2005)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
- |           |                               |    |
|-----------|-------------------------------|----|
| 0403561.4 | 18 February 2004 (18.02.2004) | GB |
| 0412583.7 | 5 June 2004 (05.06.2004)      | GB |
| 0414028.1 | 23 June 2004 (23.06.2004)     | GB |
| 0423500.8 | 22 October 2004 (22.10.2004)  | GB |
- (71) Applicant and  
(72) Inventor: LINDSAY, Norman, Matheson [GB/GB]; 19 Bachelors Way, Amersham, Buckinghamshire HP7 9AH (GB).
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO,

[Continued on next page]

(54) Title: METHODS AND SYSTEMS USING PREDICTION OF OUTCOME FOR LAUNCHED OBJECTS



(57) Abstract: Each golfer (1-3) on a golf range (4) has an individual display (12-14) showing at least a predicted outcome of each of his/her shots, and a launch-analyser (6-8) to measure velocity vectors of the ball and/or club at strike for central-computation (9) of the prediction. Vibration and piezo-cable sensors (54, 55; 68, 69) at instrumented targets (5; 41-45, 47) distributed throughout the range (4), detect the presence of balls arriving in their respective locations for matching with launched balls using the computed predictions and probability; active or passive radio-frequency identification and location of balls may also be used. Where a match is found, error between predicted and actual outcome is applied to adaptive correction of the prediction computing process, and the actual outcome is displayed to the golfer instead of the prediction. Ball and/or club velocity vectors, and ball spin, at launch are measured from light changes occurring in detection planes (96, 97; 105; 114-117; 134; 144-146) defined by slit apertures (94, 95; 104), and resulting from retro-reflection from ball (91; 110; 131) and/or club (130).



SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

**Published:**

- *with international search report*
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*